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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,273	06/20/2003	Qinghong K. Gao	015290-704	6096

7590 06/22/2005

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EXAMINER
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DHINGRA, RAKESH KUMAR

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 06/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/600,273	Applicant(s) GAO ET AL.	
	Examiner Rakesh K. Dhingra	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2003.  
 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.  
 4a) Of the above claim(s) 12-20 is/are withdrawn from consideration.  
 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
 6) ☒ Claim(s) 1-11 is/are rejected.  
 7) ☒ Claim(s) 5 is/are objected to.  
 8) ☒ Claim(s) 12-20 are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☒ The drawing(s) filed on 20 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) ☐ All b) ☐ Some \* c) ☐ None of:  
 1. ☐ Certified copies of the priority documents have been received.  
 2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
 \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>06/03</u> . | 6) <input type="checkbox"/> Other: _____  |

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**DETAILED ACTION**

***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claim 1-11, drawn to Apparatus, classified in class 156, subclass 345.53.
- II. Claim 12-20, drawn to Method, classified in class 438, subclass 715.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus as claimed can be used for processing a non-wafer substrate in a non-semiconductor processing chamber.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification; restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Pete Skiff on 06/14/05 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-11. Affirmation of this election must be made by applicant in replying to this Office action. Claim 12-20 withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

***Claim Objections***

Claim 5 objected to because of the following informalities:

In line 1, it is suggested to change "Claim 5" to "Claim 1".

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1, 2, 3, 4, 5, 6, 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lenz et al (US Patent No. 5,609,720) in view of Felts (US Patent No. 6,015,595)**

Regarding Claim 1: Lenz et al teach a multiple zone gas distribution apparatus (Figures 1-3) using multiple zone gas distribution apparatus (column 2, lines 16-40) for

controlling temperature across a workpiece during processing, the apparatus comprising:

a chuck 22 having a top face 32 configured to hold a work piece W during processing, the chuck top face defining inner and outer zones between the top face of the chuck and the workpiece into which zone coolant gas may be admitted;

inner and outer zone feed lines 36, 37, 38 for feeding the coolant gas to the inner and outer zones of the chuck (column 4, lines 50-55);

a pressure and flow control system (Pressure Sensors 40-42, and Pressure Control Valves 44-46) for supplying zone coolant gas to the feed lines with separate pressures for the inner and outer zones controlled to control the temperature across the workpiece (Column 4, lines 55-60);

and inner and outer zone bleed lines 47, 48, 49 connected to the inner and outer zone feed lines between the pressure and flow control system and the chuck; and the outer zone bleed line has evacuation valve 52 for pressure release (Column 4, lines 55-60).

Lenz et al also teach adjustable valve 50 (adjustable orifice) in the inner zone bleed line. Felts (US Patent No. 6,015,595) teaches a plasma apparatus (Figures 1) in which adjustable valve 49 can be replaced with fixed orifice to provide predetermined flow of process gas (Column 6, lines 3-7).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to replace adjustable valve 50 with a fixed orifice as taught by Felts in the inner zone bleed line (He exhaust line) to provide predetermined flow of gas.

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Regarding Claims 2, 11: Lenz et al teach that outer zone bleed line has adjustable evacuation valve 52. Depending upon process requirements this valve can be closed, in which case the pressure bleeds between the chuck and the workpiece to the surrounding chamber.

Per Case Law: "A claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)."

Also per Case Law: "Claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Apparatus claims cover what a device is, not what a device does *Hewlett-Packard Co. V. Bausch & Lomb Inc.*, 15USPQ2d 1525, 1528 (Fed. Cir. 1990)".

Regarding Claim 3: Lenz et al teach that the inner and outer zones 60, 61, 62 are concentric circular zones (Figure 3 and Column 5, lines 13-17).

Regarding Claim 4: Lenz et al teach that the in the apparatus (Figure 1-3) the inner and outer zones of the chuck top face each include a plurality of holes 64 arranged in circular pattern for delivery of coolant gas (Column 5, lines 20-25).

Regarding Claim 5: Lenz et al teach that the inner and outer zones of the chuck top face include at least one shallow circular groove 66 to provide easy flow of coolant gas from the plurality of holes in a circular direction along the underside of the wafer (Column 5, lines 25-35).

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Regarding Claim 6: Lenz et al teach that the pressure and flow control system (Pressure Control Valves 44, 45, 46, Bleed Valves 50, 51, 52) control the supply of zone coolant gas to the feed lines to achieve different pressures in the inner and outer zones throughout the processing of a workpiece to control the temperature across the workpiece (Column 2, lines 20-40).

**Claims 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lenz et al (US Patent No. 5,609,720) in view of Felts (US Patent No. 6,015,595) as applied to Claim 1 above and further in view of Matsuda et al (US Patent No. 6,254,683).**

Regarding Claim 7: Lenz et al in view of Felts teach all limitations of claim 1 but do not teach bypass in the inner zone bleed line.

Matsuda et al teach an apparatus (Figure 1) that has a by-pass line 17a for the Helium gas incoming line 18, provided with a valve 42 to enable faster evacuation and improve throughput (Column 7, lines 12-19 and Column 6, lines 50-65) and that the by-pass line 17a provides an additional path to the Helium incoming line 18 with a fixed orifice (valve) 40. Matsuda et al further teach that in this apparatus two or more lines for heat conductive gas (for inner and outer zones) may be used (Column 7, lines 45-48) as required for process. Evacuation time of 5 seconds or less is process limitation and the disclosed apparatus is capable of being operated under conditions claimed by adjusting by-pass valves.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use evacuations valves in the He bleed lines as taught by Matsuda et al in the apparatus of Lenz et al in view of Felts to obtain improved throughput.

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**Claims 8, 9, 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lenz et al (US Patent No. 5,609,720) in view of Felts (US Patent No. 6,015,595) as applied to Claim 1 and further in view of Ito et al (JP 10163308 A).**

Regarding Claim 8: Lenz et al in view of Felts teach all limitation of claim except for pressure and flow control system providing a signal indicating de-chucking.

Ito et al teach an apparatus (Figure 1-3) that has a Controller 18 which facilitates release of wafer 7 by using a set value, which is reaction difference between electrostatic attraction and back side pressure of Helium.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use the pressure signal from the pressure controllers as taught by Ito et al in the apparatus of Lenz et al in view of Felts to facilitate release of wafer.

Regarding Claim 9: Lenz et al teach that the zones 60, 61, 62 are concentric circular zones (Figure 3 and Column 5, lines 13 -17).

Regarding Claim 10: Lenz et al teach (Per Figure 3) that zones 60, 61, 62 are inner, middle and outer concentric zones respectively.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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**Ikeda (US Pub. No. 2001/0052359)** teaches an apparatus (Figures 2) in which temperature of substrate 19 is controlled by the thermal transfer characteristics of the cooling gas and pressure of He gas is preset by a pressure setting part 50a and gas flow rate is controlled such that measured pressure becomes equal to the set pressure by a pressure control valve 46.

**Lue et al (US Patent No. 5,761,023)** teach an apparatus (Figure 1) that has a chuck 14 with multiple pressure zones and a seal area is provided between different zones to allow different gas pressures in the two zones. A closed loop control system varies the heat transfer gas pressure in accordance with temperature sensor 96 using a controller 39. Another aspect is limited substrate contact using protrusions 66 to maximize heat transfer flow.

**McMillin et al (US Patent No. 5,835,334)** teach an apparatus (Figure 1,2) that comprises an actively temperature controlled electrostatic chuck 100 with feedback control. The chuck has a cap 1 and a dielectric layer for holding backside of wafer 4. The chuck is heated by resistive element and is cooled by circulating cooling fluid through body of chuck. Coolant gas is provided at the back side of wafer to improve thermal transfer.

**Sekine (JP 01251735 A)** teaches an apparatus (Figures 1, 2) that uses an electrostatic chuck 20, a wafer 18 and cathode 14. The chuck has two or more concentric grooves 25 with gas introduction holes 26 for cooling gas Helium. The apparatus uses differential pressures in different zones of chuck to obtain uniform temperature on the wafer.

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**Tsubone et al (US Patent No. 5,320,982)** teach a plasma apparatus (Figure 1) that has a valve 21 in bypass line 22 for bypass of the flow rate regulator 16. The by-pass line and exhaust line 23 are disposed in order to exhaust the Helium gas remaining in the supply pipeline 15 when the operation of the apparatus is stopped.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh K Dhingra



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Art Unit 1763